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(54) Title: WRINKLE REDUCTION LAUNDRY PRODUCT COMPOSITIONS

(57) Abstract

The present application relates to the inclusion of one or more wrinkle reducing ingredients in a laundry detergent product. The benefits are delivered to the laundered item during the cleaning step and, therefore, reduces the need for further wrinkle reducing steps when the items are taken from the dryer or after hang drying.

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WRINKLE REDUCTION LAUNDRY PRODUCT COMPOSITIONS

Technical Field

The present invention relates to laundry product compositions for reducing fabric wrinkling.

Background of the Invention

When textiles, such as clothing, linens and the like, are laundered, it is typically desired that wrinkles be eliminated or minimized after the cleaning and drying process. Mechanical wrinkle reduction techniques, such as heat and pressure (for example, ironing), have been used but can be time consuming and inconvenient.

Known attempts to reduce wrinkles by means of chemical ingredients in the wash include the use of zwitterionic surfactants, aminosilicones, curable aminosilicones, cellulase enzymes and alkyl amides. However, each of these ingredients have one or more drawbacks. For example, zwitterionic surfactants are believed to work best in cold water. Aminosilicones can cause yellowing and can be difficult to formulate. Curable aminosilicones require the heat of an iron to reduce wrinkles. Cellulase enzymes generally require several wash cycles before anti-wrinkle benefits become noticeable. Alkyl amides are not very effective relative to other wrinkle reducing agents.

Therefore, there is a need for an effective and efficient means for eliminating or reducing wrinkles in textiles. To be effective and efficient, the ingredient should preferably work across a broad range of water temperatures, not require the use of an

iron, have little to no discoloration effect on the laundered item and/or provide a noticeable wrinkle reducing benefit after relatively few wash cycles.

Statement of Invention

The present application relates to the inclusion of one or more wrinkle reducing ingredients in a laundry detergent product.

Thus, a first aspect of the present invention provides a laundry detergent formulation comprising a wrinkle reducing agent selected from one or more of polalkyleneoxide modified polydimethylsiloxanes; linear aminopolydimethyl-siloxane polalkyleneoxide copolymers; sulphated vegetable oils; sulphonated vegetable oils; high molecular weight polacrylamides; betaine siloxane copolymers; and alkylactam siloxane copolymers.

A second aspect of the present invention provides a detergent formulation comprising a wrinkle reducing agent comprising one or more compounds that do not have a net positive charge.

The benefits are delivered to the laundered item during the cleaning step and, therefore, reduces the need for further wrinkle reducing steps when the items are taken from the dryer or after hang drying.

A third aspect of the present invention provides a method of reducing the occurrence of wrinkles in laundered clothing comprising:

providing a detergent formulation according to the first or second aspect of the invention;

contacting the detergent formulation with clothing during a washing procedure;

and allowing the clothing to dry.

The laundered clothing has fewer wrinkles present than the same clothing if laundered and dried in the same or similar manner with a detergent formulation which is identical, except that it does not include the wrinkle-reducing agent.

The product can be provided in any suitable form, for example, as a powder, liquid or tablet. Delivery can be achieved by direct dosing, drawer dispensing or by other known dosing means. Tablets can also be dosed in mesh bags.

The ingredients that facilitate the benefit of wrinkle reduction are believed to lubricate fiber surfaces. By lubricating the fiber surfaces of garments, for example, the fibers slide more easily relative to each other and are less likely to entangle, resulting in less wrinkles. The preferred fiber lubricants disclosed herein have been shown to noticeably reduce the number of wrinkles. The preferred embodiments also overcome one or more of the above noted disadvantages of prior wrinkle reducing agents or methods.

While it is known that lubricants can be used to reduce wrinkles in textiles, it was surprisingly found that these materials work from a main wash detergent. More particularly, main wash detergents are highly diluted and are subject to one or more rinse cycles. Such high dilution and rinsing would be expected to diminish or eliminate the desired wrinkle reduction effect of the lubricant.

Detailed Description of the Invention

Several molecules have been identified for wrinkle reduction benefits when included in known liquid detergent formulations. Using the American Association of Textile Chemists and Colorists (AATCC) method # 124 (described in greater detail, below), the claimed molecular classes were found to reduce the number of wrinkles on test cloths. A preferred wrinkle reducing agent is a polyalkyleneoxide modified polydimethylsiloxane, for example that sold under the name Silwet L-7622, available from Witco, Greenwich, CT. Other most preferred wrinkle reducing agents are sulphated canola oil and/or castor oil available from Freedom Chemical Co., Charlotte, NC.

One or more of the molecules/compounds from the above-identified classes are preferably included in known detergent formulations in an effective amount sufficing to reduce the occurrence of wrinkles as compared to clothing laundered and dried in a similar manner with a detergent formulation that excludes the wrinkle reducing agents. An effective amount of the wrinkle reducing ingredient is preferably from about 0.1 wt % to about 5 wt % and most preferably from about 0.3 wt % to about 1.5 wt %. However, sulphated/sulphonated vegetable oils can be used at even higher levels, such as from 0.1 wt % to 10 wt % due to their ease of formulation and relatively low cost. Suitable liquid detergent formulations are described, for example, in U.S. Patent Nos.: 4,261,868; 4,322,308; 4,959,179; 5,089,163; 5,147,576; and 5,205,957, all of which are incorporated herein by reference.

An additional advantage of the above-identified wrinkle reducing ingredients is that the molecules/compounds do not have a net positive charge in a neutral or alkaline medium, i.e. a medium having a pH greater than or equal to about 6.5. Lack of a net positive charge makes their inclusion in liquid detergents containing anionic surfactants much easier. More specifically, they are less likely to precipitate with negatively charged surfactants.

A further advantage is the likelihood of "yellowing" fabrics with the above wrinkle reducing molecules is less than with amine-containing ingredients. In addition, some of the above wrinkle reducing ingredients, such as sulphated vegetable oils, are relatively inexpensive.

The detergent formulations of the invention may contain a surface-active compound (surfactant) which may be chosen from soap and non-soap anionic, cationic, non-ionic, amphoteric and zwitterionic surface-active compounds and mixtures thereof. Many suitable surface-active compounds are available and are fully described in the literature, for example, in "Surface-Active Agents and Detergents", Volumes I and II, by Schwartz, Perry and Berch.

The preferred detergent-active compounds that can be used are soaps and synthetic non-soap anionic and non-ionic compounds.

The formulations of the invention may contain linear alkylbenzene sulphonate, particularly linear alkylbenzene sulphonates having an alkyl chain length of C_8-C_{15}. It is preferred if the level of linear alkylbenzene sulphonate is from 0 wt% to 30 wt%, more preferably 1 wt% to 25 wt%, most preferably from 2 wt% to 15 wt%.

The formulations of the invention may contain other anionic surfactants in amounts additional to the percentages quoted above. Suitable anionic surfactants are well-known to those skilled in the art. Examples include primary and secondary alkyl sulphates, particularly C_8-C_{15} primary alkyl sulphates; alkyl ether sulphates; olefin sulphonates; alkyl xylene sulphonates; dialkyl sulphosuccinates; and fatty acid ester sulphonates. Sodium salts are generally preferred.

The formulations of the invention may also contain non-ionic surfactant. Nonionic surfactants that may be used include the primary and secondary alcohol ethoxylates,

especially the C_8-C_{20} aliphatic alcohols ethoxylated with an average of from 1 to 20 moles of ethylene oxide per mole of alcohol, and more especially the C_{10}-C_{15} primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10 moles of ethylene oxide per mole of alcohol. Non-ethoxylated nonionic surfactants include alkylpolyglycosides, glycerol monoethers, and polyhydroxyamides (glucamide).

It is preferred if the level of non-ionic surfactant is from 0 wt% to 30 wt%, preferably from 1 wt% to 25 wt%, most preferably from 2 wt% to 15 wt%.

The choice of surface-active compound (surfactant), and the amount present, will depend on the intended use of the detergent composition. In fabric washing compositions, different surfactant systems may be chosen, as is well known to the skilled formulator, for handwashing products and for products intended for use in different types of washing machine.

The total amount of surfactant present will also depend on the intended end use and may be as high as 60 wt%, for example, in a composition for washing fabrics by hand. In compositions for machine washing of fabrics, an amount of from 5 to 40 wt% is generally appropriate. Typically the compositions will comprise at least 2 wt% surfactant e.g. 2-60%, preferably 15-40% most preferably 5-35%.

Detergent formulations suitable for use in most automatic fabric washing machines generally contain anionic non-soap surfactant, or non-ionic surfactant, or combinations of the two in any suitable ratio, optionally together with soap.

Conventional fabric conditioning compound may optionally be used in the formulations of the present invention. The conditioning compounds may be cationic or non-ionic. If the fabric conditioning compound is to be employed in a main wash detergent composition the compound will typically be non-ionic. For rinse cycle products,

typically be cationic. The term fabric conditioning compound as used herein includes fabric softening compounds or agents.

The fabric conditioning compound is suitably a substantially water insoluble quaternary ammonium material comprising a single alkyl or alkenyl long chain having an average chain length greater than or equal to C_{20} or, more preferably, a compound comprising a polar head group and two alkyl or alkenyl chains having an average chain length greater than or equal to C_{14}.

Preferably the fabric conditioning compound has two long chain alkyl or alkenyl chains each having an average chain length greater than or equal to C_{16}. Most preferably at least 50% of the long chain alkyl or alkenyl groups have a chain length of C_{18} or above. It is preferred if the long chain alkyl or alkenyl groups of the fabric conditioning compounds are predominantly linear.

The fabric conditioning compounds which optionally may be used in the formulations of the invention are preferably compounds that provide excellent softening, and are characterised by a chain melting Lβ to Lα transition temperature greater than 25°C, preferably greater than 35°C, most preferably greater than 45°C. This Lβ to Lα transition can be measured by DSC as defined in " Handbook of Lipid Bilayers, D Marsh, CRC Press, Boca Raton, Florida, 1990 (pages 137 and 337).

Substantially insoluble fabric conditioning compounds in the context of this invention are defined as fabric conditioning compounds having a solubility less than 1×10^{-3} wt % in demineralised water at 20°C. Preferably the fabric softening compounds have a solubility less than 1×10^{-4} wt %, most preferably less than 1×10^{-8} to 1×10^{-6}.

The formulations of the invention, when used as main wash fabric washing compositions, will generally also contain one or more detergency builders. The total

amount of detergency builder in the compositions will typically range from 5 to 80 wt%, preferably from 10 to 60 wt%.

Inorganic builders that may be present include sodium carbonate, if desired in combination with a crystallisation seed for calcium carbonate, as disclosed in GB 1 437 950 (Unilever); crystalline and amorphous aluminosilicates, for example, zeolites as disclosed in GB 1 473 201 (Henkel), amorphous aluminosilicates as disclosed in GB 1 473 202 (Henkel) and mixed crystalline/amorphous aluminosilicates as disclosed in GB 1 470 250 (Procter & Gamble); and layered silicates as disclosed in EP 164 514B (Hoechst). Inorganic phosphate builders, for example, sodium orthophosphate, pyrophosphate and tripolyphosphate are also suitable for use with this invention.

The formulations of the invention preferably contain an alkali metal, preferably sodium, aluminosilicate builder. Sodium aluminosilicates may generally be incorporated in amounts of from 10 to 70% by weight (anhydrous basis), preferably from 25 to 50 wt%.

The alkali metal aluminosilicate may be either crystalline or amorphous or mixtures thereof, having the general formula: 0.8-1.5 Na_2O. Al_2O_3. 0.8-6 SiO_2

These materials contain some bound water and are required to have a calcium ion exchange capacity of at least 50 mg CaO/g. The preferred sodium aluminosilicates contain 1.5-3.5 SiO_2 units (in the formula above). Both the amorphous and the crystalline materials can be prepared readily by reaction between sodium silicate and sodium aluminate, as amply described in the literature. Suitable crystalline sodium aluminosilicate ion-exchange detergency builders are described, for example, in GB 1 429 143 (Procter & Gamble). The preferred sodium aluminosilicates of this type are the well-known commercially available zeolites A and X, and mixtures thereof.

The zeolite may be the commercially available zeolite 4A now widely used in laundry detergent powders. However, according to a preferred embodiment of the invention, the

zeolite builder incorporated in the compositions of the invention is maximum aluminium zeolite P (zeolite MAP) as described and claimed in EP 384 070A (Unilever). Zeolite MAP is defined as an alkali metal aluminosilicate of the zeolite P type having a silicon to aluminium ratio not exceeding 1.33, preferably within the range of from 0.90 to 1.33, and more preferably within the range of from 0.90 to 1.20.

Especially preferred is zeolite MAP having a silicon to aluminium ratio not exceeding 1.07, more preferably about 1.00. The calcium binding capacity of zeolite MAP is generally at least 150 mg CaO per g of anhydrous material.

Organic builders that may be present include polycarboxylate polymers such as polyacrylates, acrylic/maleic copolymers, and acrylic phosphinates; monomeric polycarboxylates such as citrates, gluconates, oxydisuccinates, glycerol mono-, di and trisuccinates, carboxymethyloxy succinates, carboxymethyloxymalonates, dipicolinates, hydroxyethyliminodiacetates, alkyl- and alkenylmalonates and succinates; and sulphonated fatty acid salts. This list is not intended to be exhaustive.

Especially preferred organic builders are citrates, suitably used in amounts of from 5 to 30 wt%, preferably from 10 to 25 wt%; and acrylic polymers, more especially acrylic/maleic copolymers, suitably used in amounts of from 0.5 to 15 wt%, preferably from 1 to 10 wt%.

Builders, both inorganic and organic, are preferably present in alkali metal salt, especially sodium salt, form.

Formulations according to the invention may also suitably contain a bleach system. Fabric washing compositions may desirably contain peroxy bleach compounds, for example, inorganic persalts or organic peroxyacids, capable of yielding hydrogen peroxide in aqueous solution.

Suitable peroxy bleach compounds include organic peroxides such as urea peroxide, and inorganic persalts such as the alkali metal perborates, percarbonates, perphosphates, persilicates and persulphates. Preferred inorganic persalts are sodium perborate monohydrate and tetrahydrate, and sodium percarbonate.

Especially preferred is sodium percarbonate having a protective coating against destabilisation by moisture. Sodium percarbonate having a protective coating comprising sodium metaborate and sodium silicate is disclosed in GB 2 123 044B (Kao).

The peroxy bleach compound is suitably present in an amount of from 0.1 to 35 wt%, preferably from 0.5 to 25 wt%. The peroxy bleach compound may be used in conjunction with a bleach activator (bleach precursor) to improve bleaching action at low wash temperatures. The bleach precursor is suitably present in an amount of from 0.1 to 8 wt%, preferably from 0.5 to 5 wt%.

Preferred bleach precursors are peroxycarboxylic acid precursors, more especially peracetic acid precursors and pernoanoic acid precursors. Especially preferred bleach precursors suitable for use in the present invention are N,N,N',N.-tetracetyl ethylenediamine (TAED) and sodium noanoyloxybenzene sulphonate (SNOBS). The novel quaternary ammonium and phosphonium bleach precursors disclosed in US 4 751 015 and US 4 818 426 (Lever Brothers Company) and EP 402 971A (Unilever), and the cationic bleach precursors disclosed in EP 284 292A and EP 303 520A (Kao) are also of interest.

The bleach system can be either supplemented with or replaced by a peroxyacid. examples of such peracids can be found in US 4 686 063 and US 5 397 501 (Unilever). A preferred example is the imido peroxycarboxylic class of peracids described in EP A 325 288, EP A 349 940, DE 382 3172 and EP 325 289. A particularly preferred example is phtalimido peroxy caproic acid (PAP). Such peracids are suitably present at 0.1 - 12%, preferably 0.5 - 10%.

A bleach stabiliser (heavy metal sequestrant) may also be present. Suitable bleach stabilisers include ethylenediamine tetra-acetate (EDTA), the polyphosphonates such as Dequest (Trade Mark) and non-phosphate stabilisers such as EDDS (ethylene diamine di-succinic acid). These bleach stabilisers are also useful for stain removal especially in products containing low levels of bleaching species or no bleaching species.

An especially preferred bleach system comprises a peroxy bleach compound (preferably sodium percarbonate optionally together with a bleach activator), and a transition metal bleach catalyst as described and claimed in EP 458 397A ,EP 458 398A and EP 509 787A (Unilever).

Formulations according to the invention may also contain one or more enzyme(s). Suitable enzymes include the proteases, amylases, cellulases, oxidases, peroxidases and lipases usable for incorporation in detergent compositions. Preferred proteolytic enzymes (proteases) are, catalytically active protein materials which degrade or alter protein types of stains when present as in fabric stains in a hydrolysis reaction. They may be of any suitable origin, such as vegetable, animal, bacterial or yeast origin.

Proteolytic enzymes or proteases of various qualities and origins and having activity in various pH ranges of from 4-12 are available and can be used in the instant invention. Examples of suitable proteolytic enzymes are the stabilisins which are obtained from particular strains of B. Subtilis B. licheniformis, such as the commercially available subtilisins Maxatase (Trade Mark), as supplied by Gist Brocades N.V., Delft, Holland, and Alcalase (Trade Mark), as supplied by Novo Industri A/S, Copenhagen, Denmark.

Particularly suitable is a protease obtained from a strain of Bacillus having maximum activity throughout the pH range of 8-12, being commercially available, e.g. from Novo Industri A/S under the registered trade-names Esperase (Trade Mark) and Savinase (Trade-Mark). The preparation of these and analogous enzymes is described in GB 1 243

785. Other commercial proteases are Kazusase (Trade Mark obtainable from Showa-Denko of Japan), Optimase (Trade Mark from Miles Kali-Chemie, Hannover, West Germany), and Superase (Trade Mark obtainable from Pfizer of U.S.A.).

Detergency enzymes are commonly employed in granular form in amounts of from about 0.1 to about 3.0 wt%. However, any suitable physical form of enzyme may be used.

Other materials that may be present in detergent formulations of the invention include sodium silicate; antiredeposition agents such as cellulosic polymers; inorganic salts such as sodium sulphate; lather control agents or lather boosters as appropriate; proteolytic and lipolytic enzymes; dyes; coloured speckles; perfumes; foam controllers; fluorescers and decoupling polymers. This list is not intended to be exhaustive.

It is often advantageous if soil release polymers are present.

Test Method and Examples

Wrinkle reduction was measured by using the American Association of Textile Chemists and Colorists' (AATCC) method # 124, Appearance of Fabrics after Repeated Home Laundering. In this method, four cloth types (silk, rayon, cotton, and linen) are washed, dried and stored in a well defined way. The dried cloths are then evaluated for wrinkle content by comparison with wrinkle smoothness replicas which can be purchased from AATCC. Factors such as the light used, the angle of the cloths and replicas to the light, and the background are carefully controlled and described in the method. There are six replicas with values of 1, 2, 3, 3.5, 4, and 5 with 5 being perfectly smooth and 1 being very wrinkled. Three trained observers are asked to give a value of 1-5, to the nearest 0.5 unit, to each cloth based on which replica it most closely resembles. The results are totalled and averaged over the three observers for each cloth type. According to the method, a difference of greater than 0.17 between the

results for two products indicates there is a significant difference at the 95% confidence level. A difference of greater than or equal to 0.25 indicates a significant difference at the 99% confidence level.

Example 1

The following formulation containing a wrinkle reduction ingredient was produced:

Formulation 1

Ingredient	Percent in Formula (by weight)
sodium alcohol ethoxy sulphate	11.0
9EO alcohol ethoxylate	6.0
sodium linear alkyl benzene sulphonate	6.0
propylene glycol	4.0
Sorbitol	3.5
Borax	2.0
sodium citrate	1.5
Silwet L-7622*	1.0
protease enzyme	0.25
lipase enzyme	0.5
Water	to 100%

* Wrinkle reduction agent - polyoxyalkylene modified polydimethylsiloxane from Witco Chemical Co.

Formulation 2 (the same as formulation 1 without the wrinkle reduction agent present) was also produced.

One wash with each detergent was performed using 111.4g of detergent in 17 gallons of water at 95F. In each wash, cotton swatches were included along with six pounds of cotton ballast. The cotton swatches were used to determine the level of wrinkle reduction.

Wrinkle reduction results gave a wrinkle score of 1.78 for the L-7622-containing detergent and 1.17 for the control. These results indicate a statistical win for the detergent containing L-7622 at the 99% confidence level.

Example 2

The following formulation containing a wrinkle reduction ingredient was produced:

Formulation 3

Ingredient	Percent in Formula
sodium alcohol ethoxy sulphate	11.0
9EO alcohol ethoxylate	6.0
sodium linear alkyl benzene sulphonate	6.0
propylene glycol	4.0
Sorbitol	3.5
Borax	2.0
sodium citrate	1.5
Freedom Scano-75*	1.0
protease enzyme	0.25
lipase enzyme	0.5
Water	to 100%

* Wrinkle reduction agent - sulphated canola oil from Freedom Chemical Co.

Formulation 4 (the same as formulation 3 without the wrinkle reduction agent present) was also produced.

One wash with each detergent was performed using 111.4g of detergent in 17 gallons of water at 95F. In each wash, silk swatches were included along with six pounds of cotton ballast. The silk swatches were used to determine the level of wrinkle reduction. Wrinkle reduction results gave a wrinkle score of 2.89 for the Freedom Scano75-containing detergent and 2.39 for the control.

These results indicate a statistical win for the detergent containing Freedom Scano-75 at the 99% confidence level.

The following formulations show preferred ranges of ingredients in accordance with the present disclosure. Formulations 5 and 7 represent detergents having ethoxylated organosilicone copolymers as the wrinkle reducing agent while formulations 6 and 8

represent detergents having sulphated castor oil as the wrinkle reducing agent. Formulations 9 and 10 represent powdered and tabulated formulations, respectfully.

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FORMULATION 5

Ingredient - Chemical Name		Percent in Formula (Based on 100% Active Raw)
ALCOHOL ETHOXYLATE		4.0 - 15.0
SODIUM ALKYL ETHOXY SULPHATE		7.0 - 25.0
ALKYLBENZENE SULPHONIC ACID		4.0 - 15.0
SODIUM HYDROXIDE		0.3 - 2.5
PROPYLENE GLYCOL		2.0 - 10.0
SORBITOL		2.0 - 10.0
SODIUM TETRABORATE PENTAHYDRATE		2.0 - 10.0
SODIUM CITRATE DIHYDRATE		1.5 - 10.0
ETHOXYLATED ORGANOSILICONE COPOLYMER		0.5 - 5.0
COCONUT FATTY ACID		0.4 - 2.5
FLUORESCENT WHITENING AGENT		0.1 - 0.6
ANTIREDEPOSITION AGENT		0.15 - 1.5
Enzyme - Protease		0.15 - 1.5
Enzyme - Lipase		0 - 2.0
MONOETHANOLAMINE		0.1 - 1.5
PERFUME		0.1 - 1.0
WATER to 100%		

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FORMULATION 6

Ingredient - Chemical Name		Percent in Formula (Based on 100% Active Raw)
ALCOHOL ETHOXYLATE		4.0 - 15.0
SODIUM ALKYL ETHOXY SULPHATE		7.0 - 25.0
ALKYLBENZENE SULPHONIC ACID		4.0 - 15.0
SODIUM HYDROXIDE		0.3 - 2.5
PROPYLENE GLYCOL		2.0 - 10.0
SORBITOL		2.0 - 10.0
SODIUM TETRABORATE PENTAHYDRATE		2.0 - 10.0
SODIUM CITRATE DIHYDRATE		1.5 - 10.0
SULPHATED CASTOR OIL		0.5 - 10.0
COCONUT FATTY ACID		0.4 - 2.5
FLUORESCENT WHITENING AGENT		0.1 - 0.6
ANTIREDEPOSITION AGENT		0.15 - 1.5
Enzyme - Protease		0.15 - 1.5
Enzyme - Lipase		0 - 2.0
MONOETHANOLAMINE		0.1 - 1.5
PERFUME		0.1 - 1.0
WATER to 100%		

FORMULATION 7

Ingredient - Chemical Name		Percent in Formula (Based on 100% Active Raw)
ALCOHOL ETHOXYLATE		3.5 - 20.0
ALKYLBENZENE SULPHONIC ACID		9.5 - 30.0
SODIUM HYDROXIDE		1.0 - 10.0
ETHOXYLATED ORGANOSILICONE COPOLYMER		0.5 - 5.0
SODIUM XYLENE SULPHONATE		0.75 - 10.0
STEARIC ACID		0.09 - 0.5
SODIUM SILICATE		2.0 - 12.0
FLUORESCENT WHITENING AGENT		0.04 - 0.4
PERFUME		0.1 - 1.0
WATER to 100%		

FORMULATION 8

Ingredient - Chemical Name		Percent in Formula (Based on 100% Active Raw)
ALCOHOL ETHOXYLATE		3.5 - 20.0
ALKYLBENZENE SULPHONIC ACID		9.5 - 30.0
SODIUM HYDROXIDE		1.0 - 10.0
SULPHATED CASTOR OIL		0.5 - 10.0
SODIUM XYLENE SULPHONATE		0.75 - 10.0
STEARIC ACID		0.09 - 0.5
SODIUM SILICATE		2.0 - 12.0
FLUORESCENT WHITENING AGENT		0.04 - 0.4
PERFUME		0.1 - 1.0
WATER to 100%		

FORMULATION 9 (Detergent Powder)

Linear alkylbenzene sulphonate (LAS)		13.8%
Ethoxylated nonionics (5 to 15 moles EO)		5.2%
Sodium aluminosilicate		28%
Sodium carbonate		20%
Sodium sulphate		18%
Sodium silicate		0.5%
Polyacrylates		1.4
Sodium perborate		0 to 8%
Protease enzyme		0.5%
Perfume		0.4%
Fluorescent Whitener		0.3%
Anti-Wrinkle agent		See Table A
Water and miscellaneous		to 100%

FORMULATION 10 (Detergent Tablet)

Linear alkylbenzene sulphonate		9.4%
Ethoxylated nonionics (5 to 15 mole EO)		4%
Sodium aluminosilicate		25%
Sodium carbonate		24.5%
Sodium sulphate		5.4%
Sodium Acetate trihydrate		25%
Fluorescent whitener		0.3%
Stearic soap		0.75%
Perfume		0.4%
Protease enzyme		0.5%
Polyacrylates		1.2%
Anti-Wrinkle ingredients		See Table A
Water and miscellaneous		to 100%

Table A (Anti-wrinkle Ingredients)

Ethoxylated organosilicones		1-10%
Polyalkyleneoxide modified polydimethylsiloxane		1-10%
Linear aminopolydimethylsiloxane polyalkyeneoxides		1-10%
Sulphated oil		1-10%

Components in Table A can either be used individually or in combination with the total level being preferably between about 1 to about 10%.

While the above-identified wrinkle reducing agents are preferably incorporated in detergent compositions, they can also be used in other formulations, such as in rinse treatments or other garment care products.

All component percentages are based on weight, unless otherwise indicated. All numerical values are considered to be modified by the term "about" and should be given the broadest available range of equivalents when construing the claims.

CLAIMS:

1. A laundry detergent formulation comprising a wrinkle reducing agent selected from one or more of polyalkyleneoxide modified polydimethylsiloxanes; linear aminopolydimethyl-siloxane polyalkyleneoxide copolymers; sulphated vegetable oils; sulphonated vegetable oils; high molecular weight polyacrylamides; betaine siloxane copolymers; and alkylactam siloxane copolymers.

2. A formulation according to claim 1, wherein the wrinkle reducing agent comprises polyalkyleneoxide modified polydimethylsiloxane.

3. A formulation according either preceding claim, wherein the wrinkle reducing agent comprises a sulphated vegetable oil.

4. A formulation according to claim 3, wherein the sulphated vegetable oil comprises sulphated castor oil.

5. A formulation according to claim 3, wherein the sulphated vegetable oil comprises sulphated canola oil.

6. A formulation according to any preceding claim, wherein the wrinkle reducing agent is present in the formulation in an amount from about 0.1 wt % to about 10 wt %, preferably from about 0.1 wt% to about 5 wt%, more preferably from 0.3 wt% to 1.5 wt% of the formulation.

7. A formulation according to any preceding claim, in the form of a powder, a liquid or a tablet.

8. A method of reducing the occurrence of wrinkles in laundered clothing comprising:

providing detergent formulation according to any preceding claim;

contacting the detergent formulation with clothing during a washing procedure; and

allowing the clothing to dry.

9. A detergent formulation comprising a wrinkle reducing agent comprising one or more compounds that do not have a net positive charge.

10. A method of reducing the occurrence of wrinkles in laundered clothing comprising:

providing a detergent formulation according to claim 9;

contacting the detergent formulation with clothing during a washing procedure; and

allowing the clothing to dry.